Nico NIESER

Tiel, The Netherlands

NINE NEW SPECIES OF *PSEUDOVELIA* AND A NEW *XIPHOVELIA* (HETEROPTERA: VELIIDAE) FROM SULAWESI (INDONESIA) AND MINDANAO (PHILIPPINES)

Notes on Malesian aquatic and semiaquatic bugs (Heteroptera), V.

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Nine new species of *Pseudovelia* from Sulawesi (including the northern islands of Sangihe and Karakelong) and Mindanao are described: *P. aflia* sp. n., *P. afrofila* sp. n., *P. epimekta* sp. n., *P. koutali* sp. n., *P. mystax* sp. n. and *P. pyrokrene* from Sulawesi; *P. sangihe* sp. n. from Sangihe; *P. argyropardala* sp. n. from Karakelong and Mindanao and *P. kalami* from Mindanao. Additional data on two species and a revised key to *Pseudovelia* of the Oriental Region are also given. Finally a new species of *Xiphovelia*: *X. skoteina* sp. n. from Sulawesi is described.

Dr. N. Nieser, Htg. Eduardstr. 16, 4001 RG Tiel, The Netherlands.

Key words. – Sulawesi, Karakelong, Sangihe, Mindanao; Veliidae; *Pseudovelia*, key, new species; *Xiphovelia*, new species.

The present paper belongs to a series on the Nepomorpha and Gerromorpha of Sulawesi started by P. P. Chen and N. Nieser (papers listed in Nieser & Chen 1993). The series is a contribution to the Fauna Malesiana programme and is based on specimens mainly collected by the staff members of the Zoological Museum Amsterdam and the National Museum of Natural History Leiden, Dr. G. Zimmermann (Marburg, FRG) and the author.

Veliidae constitutes the second largest family of Gerromorpha but as its species are on average distinctly smaller and often more cryptic than Gerridae they are less well known. There are six subfamilies of which five are represented in the Oriental region. Most often encountered are the Rhagoveliinae with its principal genus *Rhagovelia*. Its representatives live on streams, often on exposed sites. The Sulawesi fauna has been revised recently by Nieser & Chen (1993). Veliinae, which are with *Velia* the predominant subfamily in Europe are represented with 1 species only in the Oriental Region (Andersen 1982). The endemic subfamily Perittopinae consists of a few cryptic species rare in collections. Haloveliinae with an Oriental-Papuan distribution live mostly on sheltered sites in mangrove or on coral banks.

Pseudovelia belongs to the large cosmopolitan subfamily Microveliinae. Representatives of this subfamily are characterized by having one segmented fore tarsi and two segmented middle and hind tarsi. They are small to very small insects many of which have more or less cryptic habits. Due to this they have been relatively little studied. On the other hand it is a species rich taxon with considerable morphological differentiation. Expectations are that detailed studies in the future will reveal that there are several more genera to be distinguished. Especially the large genus *Microvelia* as conceived at present appears to be polyphyletic; from time to time a distinct group in *Microvelia* is split off as a genus. This is the way in which *Pseudovelia* came to existence. The key to genera below may serve sort out oriental Microveliinae.

METHODS

Measurements are in mm, and are presented as the range or mean of five specimens, taken from the sample containing the holotype (if available). Length and width refer to the maximum value of the specified body part, if unspecified they refer to body length and width. Length is measured in dorsal view from anterior margin of head to apex of abdomen (inclusive genital segments) in apterous and to apex of hemielytra in macropterous specimens. If the tibial comb projects, length of tibia is measured to apex of comb, leg measurements are presented in Table 1. Width of head is measured across eyes. Antennal measurements have been lumped for sexes due to considerable overlap, on average the means in males tend to be 0.01 mm below and those in females 0.01 mm above the lumped mean for each segment. Angles are given in radians ('π').

The apical tarsal segments have, apart from the claws, a dorsal and a ventral arolium placed in the ventral incision. Of these the dorsal one is always bristle shaped and, except for fig. 10, not drawn in the figures. The ventral arolium is usually narrow but may be broad, blade-like, as in figs. 45 and 52. Pilosity is omitted in the drawings except when it is striking or diagnostic.

Depositories registered according to Arnett, Samuelson & Nishida (1993): BMKB (Kota Batu, Brunei), JTPC (Englewood, Co., U.S.A.), MBBJ (Bogor, Indonesia), MUDH (The Hague, The Netherlands), NHMW (Wien, Österreich), NMSC (Singapore), RMNH (Leiden, The Netherlands), SEMC (Lawrence, Kan. U.S.A.), USCP (Cebu City, Philippines), ZMAN (Amsterdam, The Netherlands), ZMUC (København, Danmark). Not registered: BPUH (Bagian Pertanian Universitas Haluoleo, Kendari, Sulawesi), NC (Nieser Collection, Tiel, The Netherlands), PCHC (P. P. Chen Collection, Beijing, P. R. China), ZC (Zimmermann Collection (Goßfelden (Marburg) B.R.D.).

Some additional data on the localities in Sulawesi Tenggara sampled by N. Nieser can be found in Nieser & Chen (1991). Specimens collected by Nieser are in NC unless otherwise specified.

SYSTEMATIC PART

Key to Oriental genera of Microveliinae

Adapted from Andersen 1982.

1. Claws all subterminal, inserted very close to the apex of tarsus (Irian) .... *Velohebria*
– Claws all preterminal, inserted distinctly before apex of tarsus 2
2. Larger species, length at least 3.5 mm. First antennal segment slender and very long, at least 3/4 the width of head between eyes 3
– Smaller species, length less than 3.5 mm. First antennal segment shorter and stouter 5
3. Femora modified (with hair tufts, tubercles etc.) on posterior surface (at least in males).............. 4
– Femora not modified on posterior surface (Oriental) .... *Neoalardus*
4. Eyes distinctly removed from lateroanterior angles of pronotum (W Malaysia) ...... *Lathriovelia*
– Eyes touching or very close to anterolateral angles of pronotum (Oriental) .... *Baptista*
5. First antennal segment incrassate, extending more than 2/3 of its length beyond apex of head. Apical cells of forewings reduced (or macropterous form unknown) 7
– First antennal segment more slender and usually much shorter; if not, then with normal forewing venation or shortened pronotal lobe (apterous form) 6
6. Middle tarsi with three leaflike structures subapically (claws and ventral arolium, fig. 52) (Oriental) .... *Xiphovelia*
– Middle tarsi not modified as above (Cosmopolitan) .... *Microvelia*
7. Parameres very small, segment 8 of male strongly modified ventrally (Palaeotropical and Far Eastern) .... *Pseudovelia*
– Parameres large, segment 8 in male not strongly modified (Himalayan) .... *Geovelia*

Genus ***Pseudovelia*** Hoberlandt, 1950

The genus *Pseudovelia* was erected somewhat laconically by Hoberlandt (1950 p. 38: 'Stout antennae and chiefly long first antennal joint, extending by more than 2/3 of its length beyond the apex of head are the characters on the basis of which it is possible to establish for these species a separate subgenus, *Pseudovelia* subg. n.'). Recently the genus has been thoroughly redescribed in a revision of the Oriental species by Andersen (1983). For practical purposes characteristics mentioned in the key to genera above will serve to recognize the genus. Apart from body size and relative length of (parts of) appendages good diagnostic characteristics on the species level are mainly found in secondary sexual characteristics of males. The parameres which are very small and look more or less the same in different species (fig. 2) in this genus are of little use. However, the ventral structure of first genital segment and the length of the well developed tibial combs on fore leg, which curve around the apical spur-like process on tibia provide excellent characteristics.

The following key is based on that in Andersen (1983) with insertion of the new species. *P. tjurupensis* (Lundblad), which is only known in female sex, is not included.

Key to males of *Pseudovelia* in the Oriental Region

1. Eyes densely hairy. Ventral arolium leaflike flattened (fig. 25) 2
– Eyes naked except for two ocular setae. Ventral arolium bristle-like 3
2. Length (apterous form) ♂ 2-2.2, ♀ 2.5-2.8 mm. male hind tarsus distinctly shorter than tibia; tarsal segment 1 with a row of long bristles along its entire length [Indian Subcontinent to Thailand and Sumatera] ....
.......*P. sexualis* (Paiva) [= *P. crassipes* (Lundblad)]
– Length (apterous form) ♂ 2.8, ♀ 3.0-3.2 mm. Male hind tarsus as long as tibia; tarsal segment 1

with a basal tuft of long bristles [S. China (Fu Jian)] .... *P. longitarsa* Andersen

3. Ventral lobes of head strongly produced backwards (fig. 46). Hind tarsus of male distinctly longer than tibia; tarsal segment 1 modified, twice as long as segment 2 [Thailand] .... *P. buccula* Andersen

– Ventral lobes of head not produced backwards. Hind tarsus not as above 4

4. Fore tibia swollen proximally and distally, resulting in a strongly sinuate posterior margin (Fig. 56) [N. Mindanao] .... *P. kalami* sp. n.

– Fore tibia less broad, its posterior margin evenly and gently curved 5

5. First genital segment of male with 2-5 spine-like processes or tubercles ventrally 6
Remark: under strong magnification the spine-like processes turn out to consist of a basal tubercle with a small acute tuft of closely packed bristles on top.

– First genital segment of male not as above 11

6. Head apart from the silvery hairs at inner margins of eyes also with a patch of silvery hairs mediocaudally 7

– Head mediocaudally at most with very few isolated silvery hairs not forming a patch 9

7. Segment 1 of male hind tarsus distinctly shorter than segment 2, ventral side of first genital segment of male anteriorly with a suboval cup shaped structure (fig. 50) [W. Malaysia] .... *P. lundbladi* Andersen

– Segment 1 of male hind tarsus subequal to or slightly longer than segment 2, segment 8 ventrally without cup shaped structure 8

8. First genital segment of male with one large median triangular process at base of ventral depression, in addition one slender median and a pair of lateral process near its posterior margin [Sumatera] .... *P. hypodonta* Lundblad

– First genital segment of male with two small tubercles at base and three near caudal margin of ventral depression (fig. 9) [N. Borneo] .... *P. borneensis* Andersen

9. Larger and relatively more slender species , ♂ L 2.4, W 0.83 mm. Apical comb on fore tibia of male about half as long as tibia (fig. 22), ventral impression of first genital segment bordered by five elongate and sharp processes (consisting of densely packed bristles) (figs. 20, 21) [N. Sulawesi] .... *P. epimekta* sp. n.

– Shorter and relatively chubbier species, ♂ L 2.0-2.15, W 0.80-0.84 mm. Tibial comb of male about one third the length of tibia (fig. 1), ventral impression of first genital segment bordered by 4-5 shorter processes (figs. 8, 39), ... 10

10. Ventral impression of first genital segment bordered by five processes, two pairs laterally and a single mediocaudally (figs. 3, 8) [N. Sulawesi] . ... *P. aflia* sp.n.

– Ventral impression of first genital segment bordered by four processes, a mediocaudal one absent (figs. 39, 40) [Sangihe I.] .... *P. sangihe* sp. n.

11. Trochanter of male fore leg distally with a short stout process (fig 25), first genital segment ventrally with a large spoon-shaped process (fig. 26) [N. Sulawesi] .... *P. koutali* sp. n.

– Trochanter of male fore leg more or less rounded, first genital segment ventrally at most with a cushion-like plate, no distinct ventrally directed projection 12

12. Segment 1 of male hind tarsus with ventral row of long (as long as segment, fig. 44) bristle-like hairs 13

– Segment 1 of male hind tarsus without distinct ventral row of long hairs which are as long as segment 14

13. Tibial comb 3/4 the length of fore tibia (fig. 16), length of antenna 2/3 body length (1.4/2.2) [Karakelong I., SE Mindanao] .... *P. argyropardala* sp. n.

– Comb on fore tibia of male 2/3 the length of tibia (fig. 19), length of antenna slightly less than 2/3 body length (1.18/2.0) [Philippines] .... *P. reiseni* Polhemus

14. Smaller (length of ♂ up to 2.2 mm) grey-blackish species, with a distinctly contrasting transverse orange patch anteriorly on pronotum 15

– Larger (length ♂ 2.2mm or more), brownish species, anterior orange pronotal mark not strongly contrasting 16

15. Comb on fore tibia of male about one third the length of tibia, impression ventrally on first genital segment with a transverse rim in caudal part (fig. 12) [N. Sulawesi] .... *P. afrofila* sp. n.

– Comb on fore tibia of male slightly more than half the length of tibia, ventral impression on first genital segment simple [Sri Lanka] .... *P. gnoma* Polhemus

16. Second genital segment of male with a tuft of bristles on each side; first genital segment ventrally with a broad cushion reaching across the segment in apical half (figs. 30, 31). [Hind tarsus ± half as long as tibia] [N. Sulawesi] .... *P. mystax* sp. n.

– Second genital segment of male without tufts of bristles laterally; first genital segment ventrally with a less strongly chitinized impression in apical half (fig. 36) 17

17. Length of antenna in male about 2/3 the length of body, hind tarsus 2/3 the length of hind tibia [SE. Sulawesi] .... *P. pyrokrene* sp. n.

– Length of antenna in male less than half the body length, hind tarsus about half the length of hind tibia. [Thailand, West Malaysia to Jawa] .... *P. feuerborni* Lundblad

Pseudovelia aflia sp. n.
(figs. 1-6, 8)

Type material. – Holotype apterous ♂, INDONESIA, Sulawesi Utara, near Danau Mooat, temporary stream in hills (W of Desa Kankenturan), 21. Nov. 1985, leg. G. Zimmermann (RMNH). Paratypes 14♂ 7♀ apt., 1♂ 2♀ macr., same data as holotype, distributed as follows: 1♂ (macr.) 1♀ (allotype) RMNH; 2♂ 2♀ PCHC; 1♂ JTPC; 1♂ MBBJ; 4♂ 3♀ (1♀ macr.) NC; 4♂ 3♀ (1♀ macr.) ZC; 1♂ ZMAN; 1♂ ZMUC.

Description. – Apterous specimens. Dimensions. Length ♂ 2.00-2.13, ♀ 2.40-2.52; width of head ♂ 0.50-0.52, ♀ 0.52-0.54; width of pronotum ♂ 0.68-0.72, ♀ 0.73-0.78; width (across metanotum/first abdominal tergite) ♂ 0.80-0.84, ♀ 0.92-0.98. Colour and pilosity. Generally pale brownish with a greyish tinge, suture between body sclerites blackish, legs and antennae light brown. Patches of silvery hairs along inner margins of eyes rather inconspicuous; laterally on first abdominal tergite and mediocaudally on tergites 2-6, variable and indistinct in some specimens. Body clothed with rather short and sparse, erect brownish pilosity.

Length of antennal segments I-IV, 0.40: 0.25: 0.24: 0.42. Anterior quarter of pronotum and swollen anterolateral angles smooth, posterior three quarters coarsely punctate. Lateral margins distinctly indented about halfway on anteroposterior line, greatest width just anterior of indentation. Ventral arolia bristle like. Middle tibia with about six long erect hairs on inner side of apical half. Hind tibia with slightly denser and thicker pilosity apically.

Male. Elongate, connexiva roughly horizontal, lateral margins parallel to slightly diverging in anterior, converging in posterior half. Length of antenna two thirds of body length (1.3/2.1). Pronotum one and three quarters as wide as its median length (0.74/0.42), distinctly narrower than width across metanotum. Anterior trochanter rounded. Apical comb on fore tibia relatively short, ± one third (0.2/0.6) tibial length (fig. 1), consisting of about 90 teeth of equal width except for a small group of narrower teeth in the middle. First segment of hind tarsus apart from the normal pilosity with about 7 long (longer than diameter of segment) cilia ventrally. Abdominal tergite 1 large, coarsely punctate, tergites 1 and 2 nearly flat, in lateral view level with or raised slightly above connexiva. Pregenital tergite ± one fifth the dorsal median length of abdomen. First genital segment with a large ventral impression with five spine-like processes on its margin (figs. 3, 4, 8).

Female. Oval shaped, bulkier than male. Connexiva slanting ± 0.25π upward, their lateral margin evenly curved with its greatest width on tergite 4. Length of antenna slightly over half the length of body (1.30/2.45). Pronotum twice as wide as long as its median length (0.78/0.41), distinctly narrower than width across metanotum. Abdominal tergites 1-2, only slightly convex dorsally, in lateral view hardly rising above the margin of connexiva. Caudal apices of connexiva remaining considerably removed from each other, leaving tergite 7 visible. Tergite 8 oriented horizontally, fully visible in dorsal view. Pregenital segment large, its sternite slightly more than one fourth the median length of abdominal venter (0.50/1.75). Genital segments relatively large and protruding caudally, more or less U-shaped in caudal view (figs. 5, 6).

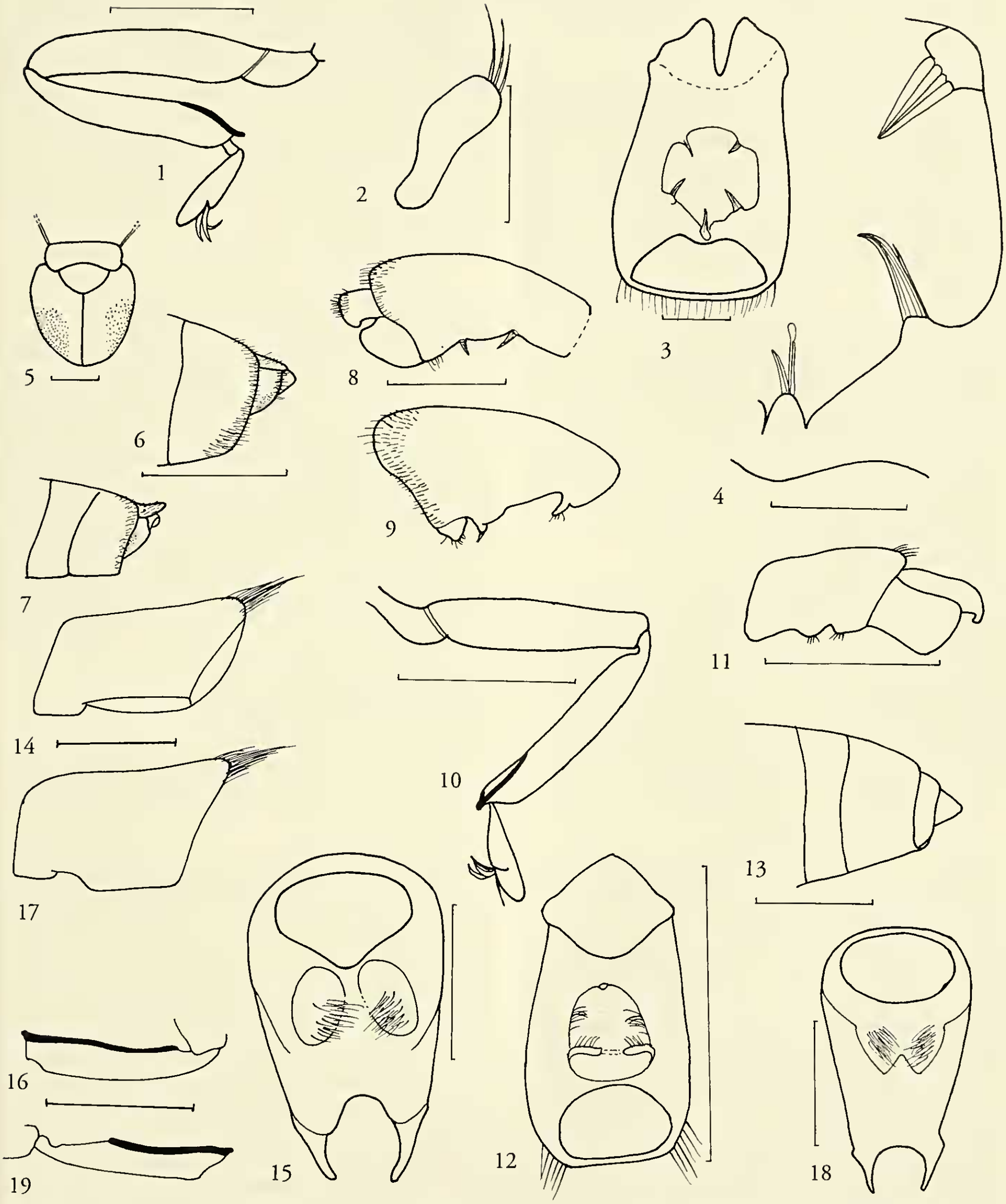
Macropterous form. – Structurally essentially as apterous form except for the usual modifications of macropters in the subfamily. Length ♂ 2.2, ♀ 2.3-2.5; humeral width of pronotum ♂ 1.00, ♀ 1.00-1.10. Hemielytra light grey-brown with an, usually ill defined, elongate sordid white stripe at base. Venation rather indistinct, two elongate basal cells, of which the one near hind (inner) margin seems two be divided. In addition two shorter apical cells. Base of abdomen with distinct lateral (near connexival sutures) keels on tergites 1-3 and a sorter, less distinct sublateral pair on tergites 1 and 2.

Etymology. – *Aflios* (Greek adjective meaning poor, meagre) refers to the comparatively poor pilosity on body.

Comparative notes. – The male genitalia are somewhat similar to those of *P. borneensis* Andersen (figs. 8, 9) but *P. aflia* lacks the patch of silvery hairs mediocaudally on head, and the detailed structure of 1st genital segment in ♂ is different in that the rim of the impression is thicker in *P. aflia* and the warts on which the ventral groups of bristles are placed are less strongly developed. Females of *P. borneensis* have tergite 8 somewhat more produced caudally and abdominal segment 7 somewhat less pilose laterally (figs. 6, 7). The male genitalia also remind those of *P. buccula* Andersen, an aberrant species with ventral lobe of head strongly produced caudally (fig. 46) and first segment of hind tarsus very long. For comparison with *P. epimekta* see under that species.

Pseudovelia afrofila sp. n.
(figs. 10-13)

Type material. – Holotype apterous ♀, INDONESIA: Sulawesi Utara, Sungai Girian (NE slope of G. Klabat, E of Manado), mountain stream with rapids, bottom boulders to coarse sand, specimens collected



Figs. 1-6. *Pseudovelia aflia.* Paratypes: 1-4 male; 1 fore leg, 2 paramere, 3 first genital segment (segment 8) in ventral view, 4 detail of ventral impression of segment 8; 5-6 apex of abdomen of female, 5 caudal, 6 lateral view. – 7 lateral view of apex of abdomen of female of *P. borneensis* 8-9 lateral view of segment 8 of male, 8 *P. aflia*, 9 *P. borneensis.* – 10-13. *Pseudovelia afrofila.* 10-12 male allotype, 10 fore leg, 11 genital segments, lateral view, 12 segment 8, ventral view, 13 female paratype, apex of abdomen, lateral view. – 14-16 *Pseudovelia argyropardala.* Male paratypes: 14 segment 8 lateral view, 15 segment 8 ventral view, 16 fore tibia. – 17-19 *P. reiseni* male: 17 segment 8 lateral view, 18 segment 8 ventral view, 19 fore tibia.
Scale line for figs. 3 and 5: 0.1mm; figs. 10-13, 16 and 19: 0.5mm; figs. 1, 6, 8, 14, 15, 17 and 18: 0.25 mm; figs. 2 and 4: 0.05mm. Figs. 7 and 9 after Andersen (1983).

on patch of foam behind boulder, 23. June 1994, N9452, leg. N. Nieser (ZMAN). Paratype 1♂ (allotype) and 1♀, same data as holotype, (NC). All apterous.

Description. – Apterous specimens. Dimensions. Length ♂ 2.10 , ♀ 2.35-2.40; width of head ♂ 0.55, ♀ 0.58-0.60; width of pronotum ♂ 0.72, ♀ 0.80-0.85; width (across third abdominal tergite) ♂ 0.90, ♀ 1.08-1.10. Colour and pilosity. Generally dull dark grey, anterior third of pronotum pale orange, one female with an indication of orange median line; lateral halves of connexiva (dorsally and ventrally) and distal rims of acetabula brownish; antennae and legs pale yellowish to light brown, proximally lighter than distally. Patches of silvery hairs along inner margins of eyes distinct, a narrow longitudinal stripe medially on vertex shining black (due to lack of basic pilosity). Silvery hairs laterally on first abdominal tergite and on posterior parts of remaining tergites indistinct. Body covered with velvety pilosity superposed with distinct erect brownish pilosity, giving the specimens a hairy look more obvious dorsally than ventrally.

Length of antennal segments I-IV, 0.41: 0.24: 0.29: 0.43. Anterior third of pronotum and anterolateral angles smooth, posterior two thirds coarsely punctate. Greatest width of pronotum about halfway anteroposterior line, lateral margins convex without pronounced humeral angles or indentation. Ventral arolia bristle like. Middle tibia with about 5 long (twice as long as the width of tibia) hairs in apical half of inner side. First segment of hind tarsus ventrally with a few longer cilia twice as long as the width of segment.

Male. General shape elongate oval with a truncate caudal apex, connexiva more or less horizontal, their lateral margins convergent in posterior half. Length of antenna 2/3 the length of body (1.4/2.1). Pronotum less than twice as broad as its median length (0.7/0.4). Anterior trochanter rounded. Fore tibia with grasping comb one third the length of tibia (0.2/0.6, fig. 10), consisting of about 80 coarse teeth. Hind tibia with ciliation apically denser but not modified. First abdominal tergite large, flat dorsally, raised about as high as the edge of connexiva. Pregenital segment about one fifth the length of abdomen. First genital segment ventrally with a large impression with strongly chitinized margin in posterior half, otherwise little modified (fig. 11, 12). Second genital segment lying within first, without special features.

Female. General shape broadly oval, connexiva nearly horizontal, distinctly tapering in posterior 3/5 of abdomen. Length of antenna more than half the length of body (1.4/2.4). Pronotum nearly twice as wide as its median length (0.80/0.45), distinctly narrower than width across metanotum. Abdominal tergites 1-3, somewhat convex dorsally, in lateral view first three rising above the margin of connexiva. Caudal apices of connexiva remaining considerably removed from each other, leaving tergite 7 visible, tergite 8 slanting ventrally 0.16 π, tergites 8 and 9 fully visible in dorsal view. Segment 7 large, its tergite two thirds as long as wide (0.22/0.33),its sternite slightly more than one third the median length of abdominal venter (0.42/1.10). Genital segments well developed, basal part of gonocoxa retracted into abdomen (fig. 13).

Macropterous form unknown.

Etymology. – *Afrofilos* (aphrophilos) is a greek composite adjective meaning 'foam loving'.

Comparative notes. – The general shape (especially in females) and colour of this species is not similar to any species known from Sulawesi. It is apparently similar to *P. gnoma* Polhemus from Sri Lanka, which is unknown to me, the characteristics in the key will suffice to distinguish the species.

Remarks. – The species was found together with *P. koutali* in a patch of foam behind some boulders at an edge of the stream. Andersen (1983) reports the apparently related *P. gnoma* also from 'in foam in river' other species have, however, also been found on patches of foam.

Pseudovelia argyropardala sp. n.
(figs. 14-16, 44, 48-49)

Type material. – Holotype apterous ♂, INDONESIA: Sulawesi Utara, Pulau Karakelong, Sungai Ambela at inlet of irrigation canal for desa Ambela, large open river bed in disturbed rain forest, transition from mountain to lowland stream, only a little water (sluices in dam open), actual stream about 2m wide, 0.3-0.5m wide, water turbid, 30 Nov. 1994, N9493, leg. N. Nieser (RMNH). – Paratypes (adults only), same data as holotype 6♂ 11♀ apterous, 3♂ 5♀ macropterous, 8 lvIV-V, distributed as follows: 1♀ apt. (allotype), 1♂ 1♀ macr. RMNH, 1♂ 1♀ NHMW, 1♂ 1♀ NMSC, 1♂ 1♀ PCHC, 1♂ apt., 1♀ macr. SEMC; P. Karakelong, Sungai (at desa) Pampalu, about 200 m upstream of mouth, open lowland stream through agricultural area, mostly some shade, bottom sand and pebbles, 1. XII. 1994, N9495, leg. N. Nieser, 2♂ 1♀; P. Karakelong, Sungai Ambela at foot of waterfall, mountain stream in primary rainforest, *Pseudovelia* under overhanging rocks at edges of pond, 2. XII. 1994, N9497, leg. N. Nieser, 4♂ 12♀ apt., 1♂ 2♀ macr., 20 lv IV/V (1♀ JTPC, 1♀ MBBJ, 1♀ MUDH, 1♂ SEMC, 1♀ ZC, 1♂ 1♀ ZMUC; P. Karakelong, Sungai Sawang, lowland stream through agricultural area, very turbid after rain, *Pseudovelia* on patch of foam at edge, 3. XII. 1994, N9498, leg. N.

Nieser, 1♂ 1♀ apt., 6 lvIV/V. Pulau Salibabu, Lirung, narrow stream on very steep rocks draining, small shallow pools with much plant debris connected by trickles of water, shaded by remnants of forest, ± 350m asl., 24. XII. 1994, N9483, leg. N. Nieser 5♂ 11♀ apt., 1♀ macr. – PHILIPPINES, Mindanao: Sarangani (S. Cotabato) prov. Siquel River, pool (area ± 20 m^2, 0.2 m deep) at edge of river bed, slightly turbid stagnant water, under overhanging grassy bank, 23. XI. 1993, N9351, leg. N. Nieser, 2♀ apt., 2♂ 2♀ macr. (1♂ 1♀ macr. USCP); Lake Sebu area, stream at Bakdolong, lowland stream aspect, sand/ mud bottom, *Pseudovelia* at edge, 3.XII.1993, N9364, leg. N. Nieser, 1♀ apt.; Stream at Bakdolong, mountain stream aspect, bottom with well sized pebbles, *Pseudovelia* at edge, 3 & 4. XII. 1993, N9366, leg N. Nieser, 5♂ 10♀ apt., 1♂ 2♀ macr.(1♂ 2♀ apt to resp: NHMW, RMNH, USCP, ZMAN, 1♂ 1♀ apt. & 1♂ 1♀ macr. JTPC); stream at Bakdolong, upstream across the agricultural area, beginning of hilly area, narrow stream in limestone, shaded by shrubs and trees on the banks, *Pseudovelia* from pools mostly under overhanging ridges or tree roots, 10. XII. 1993, N9379, leg. N. Nieser, 29♂ 37♀ apt., 2♂ 4♀ macr.; Lake Sebu area, just upstream of third waterfall, edge upstream of a large boulder in mountain stream, slopes with remnants of primary forest, 7. XII. 1993, N9371, leg. N. Nieser, 2♂ 2♀ apt., 1♀ macr. (1♂ 1♀ apt. BMKB, 1♂ 1♀ apt. 1♀ macr. SEMC); Lake Sebu area, just down stream of second waterfall at edge of spray area, sheltered edge downstream of boulders, 8. XII. 1993, N9373, leg. N. Nieser, 1♂ 1♀ apt.

Description. – Apterous specimens. General shape elongate oval. Dimensions. Length ♂ 2.18-2.40, ♀ 2.53-2.75; width of head ♂ 0.56-0.59, ♀ 0.56-0.60; width of pronotum ♂ 0.77-0.80, ♀ 0.78-0.81; width (♂ across posterior margin of thorax, ♀ across abdominal tergites 4-5) ♂ 0.88-0.92, ♀ 0.94-1.03. Colour and pilosity. Generally dark grey to blackish with striking silvery spots dorsally on abdomen. Transverse band anteriorly, lateral margin and narrow median longitudinal stripe on pronotum and lateral half of connexiva brick red. Legs pale yellowish, bases and apices of segments usually darker, antennae light brown, base of rostrum pale, apical segment dark. Bands of silvery hairs along inner margins of eyes distinct; patches of silvery hairs posterior margin of metanotum, laterally on first abdominal tergite, medially on tergites 2 and 3, mediocaudally on connexiva 3-6, posterior part of tergite 6 and most of tergite 7. Compared to other species in the region the silvery patches are more strongly contrasting in this species. Body clothed with long light brown pilosity which is more erect and distinct dorsally than ventrally, especially in lateral view the species appears hirsute dorsally. Antennae and legs also rather hirsute.

Length of antennal segments I-IV, 0.38 : 0.30 : 0.32 : 0.44. Anterior quarter of pronotum slightly swollen, smooth except for a row of pits along anterior margin, coarse punctation on posterior three quarters obscured by dense pilosity. Lateral margins of pronotum smoothly curved, not or hardly indented, greatest width about halfway. Ventral arolia bristle like. Middle tibia with about six long erect hairs on inner side of apical half, becoming distinctly shorter apically. Denser and thicker pilosity apically not obvious.

Male. Connexiva roughly horizontal to slanting 0.25π upward, lateral margins nearly parallel in anterior, converging in posterior half. Length of antenna about two thirds of body length (1.45/2.2). Pronotum less than twice as wide as its median length (0.8/0.45 - 0.8/0.5), narrower than width across metanotum (0.8/0.9). Anterior trochanter rounded. Apical comb on fore tibia long, slightly over three quarters (0.5/0.65) tibial length (fig. 16), consisting of over 300 teeth of which the proximal and distal groups are much finer than those from the central interval. First segment of hind tarsus apart from the normal pilosity with a group of about 20 long (about as long as length of segment, fig. 44) cilia ventrally. Abdominal tergite 1 large, smooth, sloping downward posteriorly; tergites 2-7 flat, horizontal, in lateral view concealed by the connexiva. Pregenital tergite ± one fifth the dorsal median length of abdomen. First genital segment with a pair of ventral impressions, beset with cilia, dorsocaudal pilosity long (figs. 14, 15).

Female. Larger and bulkier than male but of same general form. Connexiva slanting 0.3π upward to nearly vertical (nearly horizontal in gravid specimens), their lateral margins nearly parallel in anterior, converging in posterior half. Length of antenna slightly more than half the length of body (1.45/2.6). Pronotum twice as wide as its median length (0.9/0.45), distinctly narrower than width across metanotum. Abdominal tergite 1 large, coarsely punctate, ± horizontal, in lateral view visible dorsally of connexiva, tergites 2-3 gradually sloping downward posteriorly, less distinctly punctate than tergite 1; tergites 4-8 flat, horizontal, in lateral view concealed by the connexiva (except in gravid females). Caudal apices of connexiva rounded, remaining considerably removed from each other, leaving tergite 7 visible. Tergite 8 oriented horizontally, fully visible in dorsal view. Pregenital segment large, its sternite about one fourth the median length of abdominal venter (0.35/1.4). Genital segments largely retracted within abdomen, more or less U-shaped in caudal view (figs. 48, 49).

Macropterous form. – Structurally essentially as apterous form except for the usual modifications of macropters in the subfamily. Length ♂ 2.55-2.60, ♀ 2.60-2.70; humeral width of pronotum ♂ 1.06-1.08, ♀ 1.12-1.15. Pronotum dark grey-brown with a lighter T-shaped mark, anterior transverse leg broad, posterior longitudinal leg narrow, disc of pronotum distinctly punctate. Hemielytra grey-brown with basal angles largely white, apical cells brownish with lighter centres and membrane greyish. Venation distinct, two elongate basal cells and two shorter apical cells. Lateral keels at base of abdomen long, reaching base of tergite 4, medial pair less distinct, reaching caudal margin of tergite 2; silvery pilosity on abdomen less developed especially anteriorly.

Etymology. – *Argyropardalos*, a greek adjective meaning 'with silvery spots', referring to the distinct patches of silvery pilosity on abdomen of most specimens.

Comparative notes. – Size in combination with pilosity, greyish colour and distinct patches of silvery hairs on abdomen sets this species apart from other Sulawesi species. This species is very similar to *P. reiseni* Polhemus from Luzon and Mindanao males of which are, however, smaller and have a relatively shorter fore tibial comb of somewhat over 200 teeth which are all coarse distally (in *argyropardala*, which has about 300 teeth in tibial comb, there is a row of very fine teeth near the distal spur) and the ventral impression on first genital segment of male less distinctly paired and much smaller (see key and figs. 14-19). Females show considerable overlap and only the smaller females of *P. reiseni* (L about 2.4) are reliably distinguishable from the larger females of *P. argyropardala* (L about 2.7).

Pseudovelia epimekta sp. n.
(figs. 20-24)

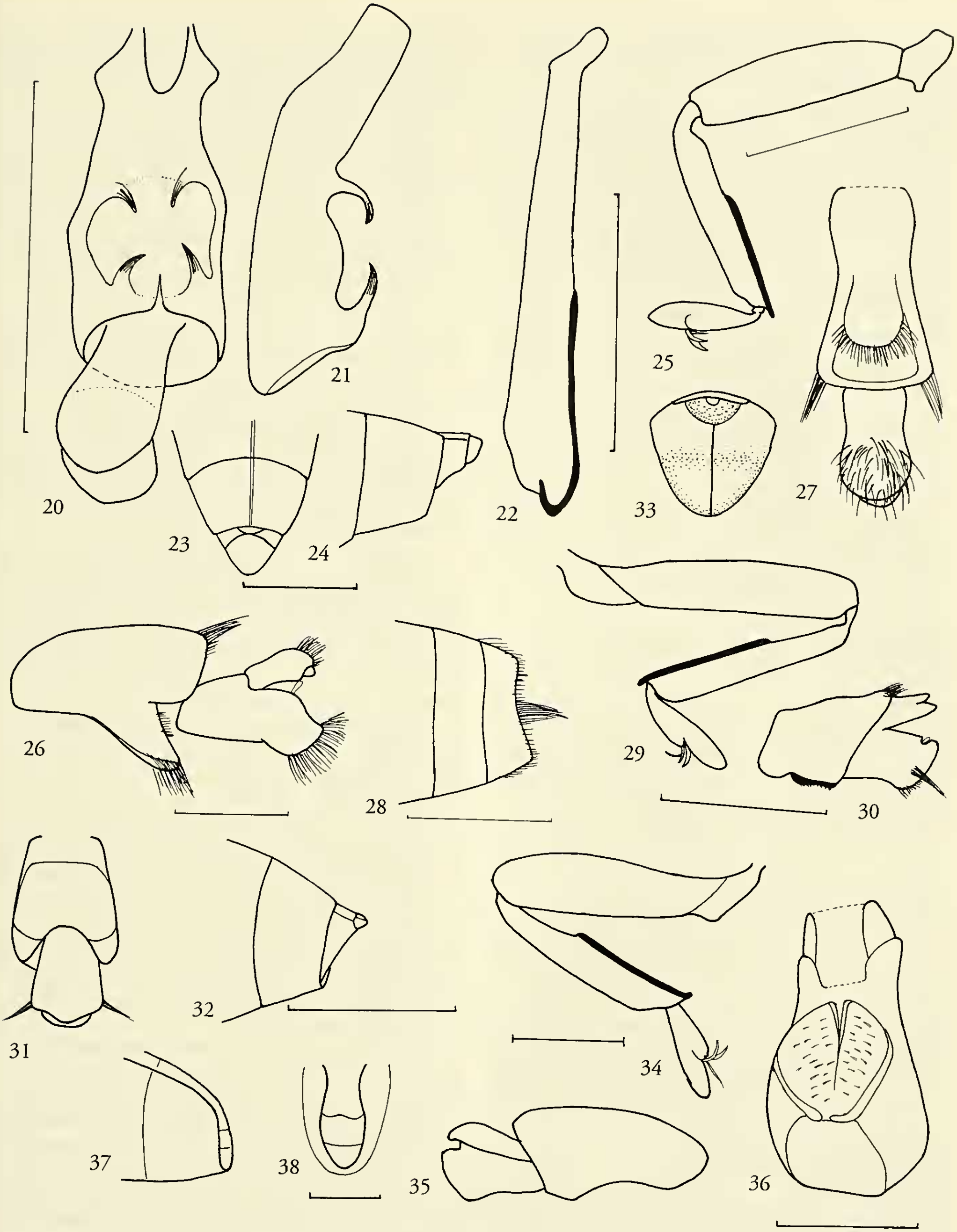
Type material. – Holotype apterous ♂, INDONESIA, Sulawesi Utara, Dumoga Bone N. P., Tumpah, ruhige Abschnitt am Moos (quiet stretch at marshland), 28. Oct. 1985, leg. G. Zimmermann (RMNH). Paratypes 2♀, same data as ♂ (1♀ NC, 1♀ allotype ZC). All apterous.

Description. – Apterous specimens. Dimensions: length ♂ 2.40, ♀ 2.50-2.65; width of head ♂ 0.53, ♀ 0.58-0.59; width of pronotum ♂ 0.68, ♀ 0.72-0.73; greatest width (across mesothorax) ♂ 0.83, ♀ 0.86-0.89.

Colour. Generally dark grey to blackish, eyes very dark brown. Head with grey stripes at inner margins of eyes. Pronotum with strongly contrasting anterior orange transverse band not interrupted in the middle, disk of pronotum medium brown with a very narrow median orange-like stripe. Connexiva somewhat brownish, more distinctly so on ventral side. Antennal segments 1-3 medium brown, segment 4 pale, whitish. Segments 2-3 of rostrum largely yellowish brown (in frontal view). Acetabula on both sides of suture brownish, legs sordid white to light brownish, apical part of femorae and basal part of tibiae medium brown.

Silvery pilosity at lateral margins of abdominal tergite 1, most of tergites 2-3,6, hind margin of tergite 5 and median part of tergite 7, quite variable especially on 6 and 7. Sparse, scattered longer erect bristles dorsally. Venter with well developed medium long somewhat yellowish pilosity, slightly denser on genital segments. Tuft of bristles at end of metasternal scent channels strongly developed. Pilosity of appendages normal, first antennal segment with two distinct erect bristles on anterior side.

Body elongare spindle-shaped, greatest width across mesothorax, subequal to width across posterior margin of abdominal segment 4 (depending on slanting of connexiva this is narrower in 1♂ 1♀ and very little wider in 1♀). Head over three fourths as long as wide (0.45/0.55), longer than median length of pronotum (0.45/0.40). Eyes small, width of an eye only slightly more than one third the interocular space (0.12/0.32). Length of antennal segments I-IV = 0.62: 0.31: 0.42: 0.64. First antennal segment distinctly longer than head, relatively slender, elongate club-shaped and softly curved, with two distinct erect bristles. Second slightly narrower, third and fourth narrowest, subequal. Rostrum nearly reaching base of metasternum. Pronotum more than half as long as wide (0.4/0.7), covering meso and metanotum except for lateroposterior angles of metanotum. Disk shallowly and indistinctly pitted, with an indistinct transverse impression halfway, somewhat more distinct in the male than in the females. Anterior transverse orange band of pronotum smooth, slightly swollen. Propleura with some coarse punctures, most distinctly a row at dorsal margin of acetabulum and another near posterior margin. Fore femur somewhat flattened on under surface in apical part. Arolia bristlelike. Connexiva with lateral margins nearly straight, subparallel on segment 1-4, converging in caudal part, slanting upward about 0.16π. Connexiva widest on segment 4, about half as wide as corresponding tergite. Median length of abdominal tergites 1-7 three times the median length of pronotum (1.40/0.45) in male, slightly more in female (1.60/0.45). Abdominal tergite 1 large, raised above dorsal margin of connexiva in lateral view, somewhat more so in females than in males, tergites 2-3 declivous, tergites 2-5 each about half as long as tergite 1, tergites 6 and 7 progressively longer, especially in male. Abdominal venter flattened in male, indistinctly so in female, with a



Figs. 20-24. *Pseudovelia epimekta.* 20-23 male holotype: 20 genital segments ventral view, 21 segment 8 lateral view, 22 fore tibia, 23-24 apex of abdomen, 23 male, ventral view, 24 female, lateral view. – 25-28, *Pseudovelia koutali,* paratypes: 25-27 male 25 fore leg, 26-27 genital segments, 26 lateral view, 27 ventral view, 28 female apex of abdomen, lateral view. – 29-33, *Pseudovelia mystax.* Paratypes: 29-31 male, 29 fore leg, 30-31 genital segments, 30 lateral view, 31 ventral view, 32-33 female apex of abdomen, 32 lateral view, 33 caudal view. Scales 0.5 mm. – 34-38 *Pseudovelia pyrokrene.* Paratypes, 34-36 male, 34 fore leg, 35 genital segments, lateral view, 36 segment 8 ventral view, 37-38 female apex of abdomen, 37 lateral view, 38 caudal view. Scale line for figs. 20-25, 28-32, 34-35: 0.5mm; figs. 26-27, 36-38: 0.25mm.

narrow, shallow, mediolongitudinal groove on sternites 5-7, sternites 6 and 7 progressively longer than preceding ones.

Male. Length of antenna five sixth the length of body (2.0/ 2.4). Comb on fore tibia long (fig. 22), about half as long as tibia consisting of about 200 teeth which are distinctly stouter in apical part. Otherwise legs without obvious characters, first segment of hind tarsi with a few longer hairs. Tergite 7 half as long as preceding abdominal tergites together. Genital segments relatively large but segment 8 nearly fully retracted within abdomen. Sternite 8 with five curved, sharply pointed processes, one, narrower, mediocaudal, one pair subcaudal and one pair halfway, surrounding a ventral impression (figs. 20-21). Parameres very small, nearly vestigial.

Female. Length of antenna slightly over three quarters the length of body (2.0/2.6). Abdominal tergite 8 horizontal, comparatively large, covering gonocoxae in dorsal view, over half as long as tergite 7 (0.18/0.3), covering gonocoxae in dorsal view. Gonocoxae large, well visible in ventral view. (figs. 23-24).

Macropterous form unknown.

Etymology. – *Epimektes*, a greek adjective meaning elongate, referring to shape of body, especially of female.

Comparative notes. – This species belongs to the *hypodonta* group of species (Andersen 1983). Segment 8 of male is most similar to that of *P. borneensis*, especially in lateral view, the mediocaudal process in *P. borneensis* is, however, stouter, more triangular. *P. borneensis* is, moreover, smaller, of lighter colour and has the first antennal segment relatively shorter and stouter. The first genital segment of the male has a similar form to that of *P. aflia* described above, but it is longer (when isolated from body 0.55 in *P. epimekta*, 0.44 in *P. aflia*) and has more solid ventral warts with bristles (figs. 3, 8, 20, 21). *P. epimekta* is, moreover, generally longer and relatively more slender than *P. aflia* with a distinctly longer first antennal segment (0.6 and 0.4 respectively). *P. aflia* and *P. epimekta* have a few silvery hairs at base of head but these are not recognizable as a silvery patch.

Pseudovelia kalami sp. n.
(figs. 56-58)

Type material. – Holotype apterous ♂ (only specimen known, right middle leg lacking, genitalia in microvial), PHILIPPINES; Mindanao, Surigao del Norte prov., Oslao, narrow mountain stream through coconut groove, bottom stones, pebbles and coarse sand, water colourless, clear, sampled at quiet edges, 29 Mar. 1993, leg. N. Nieser, N9332 (RMNH).

Apterous specimen. – General shape elongate, nearly parallel sided except anterior and posterior regions. Dimensions. Length ♂ 2.49, width (across posterior half of mesothorax) 1.02, width of pronotum 0.96, width of head ♂ 0.63.

Colour and pilosity. Generally blackish with striking silvery spots dorsally on abdomen. Transverse band on anterior half of pronotum, and lateral rim of connexiva dark orange brown. Legs, coxae trochanters and basal part of femurs yellowish, remaining parts brownish, antennae and rostrum also brownish. Bands of silvery hairs along inner margins of eyes distinct, in addition a small spot of silvery hairs mediocaudally on head; patches of silvery hairs: lateroposterior angles of metanotum, laterally on first abdominal tergite, mediocaudally on tergites 6 and 7, mediocaudally on connexiva 3-5, posterior part of tergite 6 and most of tergite 7. Compared to most species in the region the silvery patches are more strongly contrasting in this species. Body clothed with long light brown pilosity which is more erect and distinct dorsally than ventrally.

Length of antennal segments I : II : III : IV, 0.55 : 0.46 : 0.45 : 0.40. Length of antenna three quarters of body length (1.86/2.49). Hind margin of ventral lobe of head produced slightly backwards. Pronotum less than twice as wide as its median length (0.96/0.6), only slightly narrower than width across metanotum. Anterior half of pronotum slightly swollen, smooth except for some pits caudally, coarse punctation on posterior half obscured by dense pilosity. Lateral margins of pronotum smoothly curved, not indentate, greatest width about halfway.

Anterior trochanter rounded. Fore tibia proximally and distally thickened, resulting in a sinuate posterior margin, tibial comb runnig nearly the entire length of tibia (fig. 56). Middle tibia without long erect hairs on inner side. Denser and thicker pilosity apically not obvious. First segment of hind tarsus apart from the normal pilosity with a group of about 15 long (about 3 times as long as diameter of segment) cilia ventrally. Ventral arolia bristle like.

Connexiva roughly horizontal, lateral margins parallel anteriorly, converging on segments 5-7. Abdominal tergite 1 large, smooth, only slightly sloping downward posteriorly; tergites 2-7 flat, horizontal, in lateral view concealed by the connexiva. tergites 1 and 7 twice (0.3) as long as tergites 2-6 (0.15). Abdominal venter with a large and broad median impression. First genital segment with a large central impression bordered by a very high rim caudally ending in a pair of tufts of small bristles, surface of the impression anteriorly and medially also with small bristles (figs. 57-58).

Comparative notes. – General shape and colour similar to *P. argyropardala*, which is slightly smaller.

The small but distinct spot of silvery hairs mediacaudally on the head reminds of *P. pyrokrene* and *P. borneensis.* The form of the anterior tibia and the strongly developed rim around the ventral depression of first genital segment in male are, however, unique within the genus. Females will probably be recognizable by the relatively long antennal segments especially segment 2.

Etymology. – Kalami is a Greek noun, meaning tibia, in apposition, referring to the characteristic fore tibia of male.

Pseudovelia koutali sp. n.
(figs. 25-28)

Type material. – Holotype apterous ♂, INDONESIA, Sulawesi Utara, Dumoga Bone River, downstream of bridge, 22. Oct. 1985 leg. G. Zimmermann (RMNH). Paratypes 11♂ 8♀, same data as type, distributed as follows: 1♀, allotype, RMNH; 1♂ MBBJ; 2♂ 2♀ PCHC; 4♂ 2♀ NC; 3♂ 3♀ ZC; 1♂ ZMAN; Sulawesi Utara, Sungai Girian (NE slope of G. Klabat, E of Manado), mountain stream with rapids, bottom boulders to coarse sand, specimens collected on patch of foam behind boulder, 23. VI. 1994, N9452, leg. N. Nieser, 9♂ 7♀ (1♂ 1♀ JTPC, 1♂ 1♀ MUDH, 1♂ 1♀ NHMW, 1♂ 1♀ SEMC). All apterous.

Description. – Apterous specimens. Dimensions. Length ♂ 2.32-2.40, ♀ 2.80-2.92, width of head ♂ 0.54-0.56, ♀ 0.60-0.62; width of pronotum ♂ 0.78-0.80, ♀ 0.80-0.83; width (across metanotum/first abdominal tergite) ♂ 0.83-0.88, ♀ 0.97-1.03. Colour and pilosity. Generally dark brown, antennae, T-shaped mark on pronotum, lateral margin of connexiva medium brown, legs medium to light brown, coxae, trochanters and basal parts of femurs yellowish. Patches of silvery hairs along inner margins of eyes, caudolaterally on first abdominal tergite, the disks of tergites 2 and 3 and small patches medially on tergites 4 and 5. Body mostly covered with quite long, erect brownish pilosity.

Length of antennal segments I-IV 0.43 : 0.30 : 0.30 : 0.40. Anterior quarter of pronotum smooth, posterior three quarters coarsely punctate. Anterolateral angles of pronotum only slightly swollen. Ventral arolia bristle like. Middle tibia with about 6 long (twice as long as the width of tibia) hairs in apical half of inner side.

Male. General shape elongate, connexiva slanting to a variable angle, usually about 0.5π, their lateral margins convergent in posterior half. Length of antenna over half the length of body (1.4/2.4). Pronotum broader than its median length (0.7/0.5) with lateral angles about midway, very broadly rounded. Anterior trochanter with a distinct ventral tubercle (fig. 25). Fore tibia with grasping comb occupying about two thirds of the length of tibia ((0.35/0.58), consisting of about 150 teeth of equal thickness except for a group of about 25 very fine ones just proximally of the tibial spur. Hind tibia straight, with ciliation along inner margin denser in apical part, with a patch of slightly thicker cilia at extreme apex. Hind tarsal segments of subequal length, first tarsal segment ventrally with normal pilosity only. First abdominal tergite large, raised about as high as the edge of connexiva. Pregenital segment large, about one third the length of abdomen. Genital segments largely retracted within abdomen, first genital segment ventrally with a large spoon-shaped appendage (figs. 26-27).

Female. General shape bulkier than male, with connexiva tapering more strongly. Length of antenna half the length of body (1.4/2.8) or very slightly less. Pronotum wider than long (0.8/0.6), greatest width relatively more posteriorly than in male and more distinctly narrower than width across metanotum. Anterior trochanter without tubercle and tibia without comb. Pilosity of hind tibia less conspicuous than in male, basal segment of hind tarsus distinctly shorter than apical (0.2/0.3). First abdominal tergite large, convexly swollen dorsally, in lateral view distinctly rising above the margin of connexiva. Connexiva vertical, strongly converging posteriorly with apical pilosity meeting across midline and covering tergite 7. Pregenital segment large, about two fifth the length of abdomen. Genital segments small, retracted into abdomen with a distinct tuft of darker bristles, situated dorsally on the vertically oriented tergite 8, pointing caudally (fig. 28).

Etymology. – *Koutali,* a Greek noun meaning spoon, refers to the spoon shaped ventral appendage on first genital segment of male.

Comparative notes. – The male differs from other species in the genus by the tubercle on fore trochanter and the characteristic spoon shaped appendage ventrally on first genital segment. The female is characterised by the short pregenital segment and the caudal tuft of dark bristles. With the key to oriental species by Andersen (1983) this species runs to *P. gnoma* Polhemus from Sri Lanka, which is a smaller species (♂ 2.1-2.2, ♀ 2.6-2.8) with different structure of first genital segment of male. The male of *Microvelia magnifica* Lundblad which might, judging from the figures by Lundblad (1933), also be a *Pseudovelia* or a related genus different from *Microvelia* s. str. also has a ventral tongue on segment 8, but this structure is sharper apically (ventrally) and the anterior trochanter is rounded. The female of *M. magnifica* has the last segment of connexiva meeting over the tip of abdomen.

Pseudovelia mystax sp. n.
(figs. 29-33)

Type material. – Holotype apterous ♂, Sulawesi Utara, Danau Alea, 22 Nov. 1985, leg. G. Zimmermann (ZMAN). – Paratypes, 15♂ 41♀, same data as holotype, distributed as follows: 2♀ (including allotype) ZMAN; 2♀ BPUH; 2♂ 2♀ PCHC; 1♂ 2♀ JTPC; 1♂ 2♀ MBBJ; 3♂ 8♀ NC; 1♂ 2♀ RMNH; 6♂ 20♀ ZC; 1♂ 1♀ ZMUC. All apterous.

Description. – Apterous specimens. Dimensions. Length ♂ 2.20-2.26, ♀ 2.70-2.87, width (across metanotum/first abdominal tergite) ♂ 0.80-0.85, ♀ 0.95-1.003. Colour and pilosity. Generally brick red to light castaneous, sutures between body sclerites mostly blackish, coxae, trochanters and most part of femurs yellowish. Patches of silvery hairs along inner margins of eyes rather inconspicuous, more distinct laterally on first abdominal tergite and lining the sutures between tergites. Body clothed with quite long, erect brownish pilosity, more dense laterally and on venter than on dorsum.

Length of antennal segments I-IV 0.49: 0.32: 0.33: 0.46. Anterior quarter of pronotum and swollen anterolateral angles smooth, posterior three quarters coarsely punctate. Greatest width of pronotum about halfway anteroposterior line, lateral margins convex without pronounced humeral angles or indentation. Ventral arolia bristle like. Middle tibia with about 5 long (twice as long as the width of tibia) hairs in apical half of inner side.

Male. General shape elongate with a truncate caudal apex, connexiva usually more or less horizontal, their lateral margins convergent in posterior third. Length of antenna slightly less than 3/4 the length of body (1.6/2.25). Pronotum twice as broad than its median length (0.8/0.4). Anterior trochanter rounded. Fore tibia with grasping comb occupying somewhat more than half the length of tibia ((0.4/0.7, fig. 29), consisting of over 250 fine teeth except at the spur where they are distinctly coarser. Hind tibia with ciliation along inner margin apically denser but not modified. First segment of hind tarsus ventrally with normal pilosity only. First abdominal tergite large, together with second convex dorsally raised about as high as the edge of connexiva. Pregenital segment about one fifth the length of abdomen. First genital segment ventrally strongly chitinized in posterior half, otherwise little modified (figs. 30-31). Second genital segment lying within first with a pair of tufts (about 6 each) of laterally pointing whisker-like bristles which are visible even when the segment is retracted.

Female. General shape bulkier than male, with connexiva usually more or less vertical, tapering only slightly (but more distinctly than in male) posteriorly. Length of antenna more than half the length of body (1.55/2.75). Pronotum twice as wide as its median length (0.82/0.42), distinctly narrower than width across metanotum. Abdominal tergites 1-3, convex dorsally, in lateral view 1 distinctly, 2 just rising above the margin of connexiva. Caudal apices of connexiva remaining considerably removed from each other, leaving tergite 7 visible, tergite 8 oriented horizontally, fully visible in dorsal view. Pregenital segment large, its sternite slightly less than one third the median length of abdominal venter. Genital segments small, retracted into abdomen, more or less triangular in caudal view (figs. 32-33).

Macropterous form unknown.

Etymology. – *Mystax*, a noun in apposition meaning moustache or upper lip in Doric, referring to the 'caudal whiskers' of the male.

Comparative notes. – This species at first sight resembles *P. aflia* and *P. pyrokrene* because of similar general colour and shape. The bristles on segment 9 of the male separate *P. mystax* from other *Pseudovelia* in tropical Asia. The apex of abdomen in caudal view of the female is more broadly triangular than in other species although the difference with *P. aflia* is very slight.

Pseudovelia pyrokrene sp. n.
(figs. 34-38)

Type material. – Holotype ♂, INDONESIA, Sulawesi Tenggara, Kecamatan Mowewe, Sungai Mowewe, lowland stream, 28 Feb. 1989, N8922, leg. N. Nieser (ZMAN). Paratypes: same data als holotype 3♂ 12♀ distributed as follows: 1♀ (allotype) ZMAN, 1♀ MBBJ, 1♀ BPUH, 2♂ 4♀ NC, 1♂ 2♀ PCHC, 2♀ RMNH, 1♀ ZC. Road Kolaka-Kendari km 20, mountain stream, under overhanging rock, 3. Mar. 1989, N8934, leg. N. Nieser 1♀; Sungai Mokowu (± 3°49'S 121°40'E), 30. X. 1989, 1 ♂; same, 6.XI.1989, 2 ♂ 1 ♀, leg. J. van Tol (RMNH). All apterous.

Additional specimens 1 lvV, same data as holotype; P. Buton, 1st mountain stream along road Bau-Bau to Bunga, 8. III. 1989, N8935, leg. N. Nieser, 1♀ apt.

Description. – Apterous specimens. Dimensions. Length ♂ 2.30-2.44, ♀ 2.71-2.90, width (across metanotum/first abdominal tergite) ♂ 0.79-0.80, ♀ 0.91-0.93. Colour and pilosity. Generally brick red/-light castaneous to dark brown, sutures between body sclerites mostly blackish, rostrum, basal part of first antennal segment, coxae, trochanters and basal half of femurs lighter, yellowish to light brown. Patches of silvery hairs, distinctly contrasting, along inner margins of eyes lateral and caudal margin of first abdominal tergite, most of tergites 2, 3, 6 and 7 less distinct on tergites 4 and 5. Body clothed with quite sparse but distinct long pilosity, in addition to the dense short pilosity covering body.

General shape elongate. Length of antennal segments I-IV 0.44 : 0.30 : 0.34 : 0.50. Anterior quarter of pronotum and swollen anterolateral angles smooth, posterior three quarters coarsely punctate. Greatest width of pronotum about halfway anteroposterior line, lateral margins convex without pronounced humeral angles or indentation. Ventral arolia bristle-like. Middle tibia with about 5 long (twice as long as the width of tibia) hairs in apical half of inner side. First abdominal tergite coarsely punctate.

Male. Connexiva slightly slanting upward laterally, their lateral margins moderately convex, inner margins hardly convergent posteriorly. Length of antenna about 2/3 the length of body (1.6/2.35). Pronotum one and a third times as broad than its median length (0.74/0.55), slightly narrower than the width across metanotum. Anterior trochanter with a nearly perpendicular angle apically (fig. 34). Fore tibia with grasping comb occupying half the length of tibia ((0.3/0.6), consisting of nearly 150 coarse teeth except a few proximal ones and a row of 20 just before the spur, which are narrow. Hind tibia virtually straight, with ciliation along inner margin apically denser but a dark patch of small spines absent. First segment of hind tarsus ventrally with normal pilosity only. First abdominal tergite large, slightly convex dorsally raised just above the edge of connexiva. Pregenital segment about one fifth the length of abdomen. First genital segment ventrally with a large subcircular impression with a chitinized margin in posterior half, otherwise little modified (figs. 35-36). Second genital segment lying mostly within first, without structural peculiarities.

Female. Connexiva vertical in most specimens, distinctly converging posteriorly. Length of antenna more than half the length of body (1.58/2.79). Pronotum 1.4 as wide as its median length (0.8/0.56), only slightly narrower than width across metanotum. Abdominal tergites 1 large, somewhat convex dorsally, in lateral view raised slightly above the margin of connexiva, tergites 2 and 3 declining, remainder of abdominal dorsum horizontal. Caudal apices of connexiva remaining considerably removed from each other, leaving tergite 7 visible, tergite 8 oriented horizontally, fully visible in dorsal view. Pregenital segment large, its sternite slightly less than half the median length of abdominal venter. Genital segments small, retracted into abdomen, more or less U-shaped in caudal view (figs. 37-38).

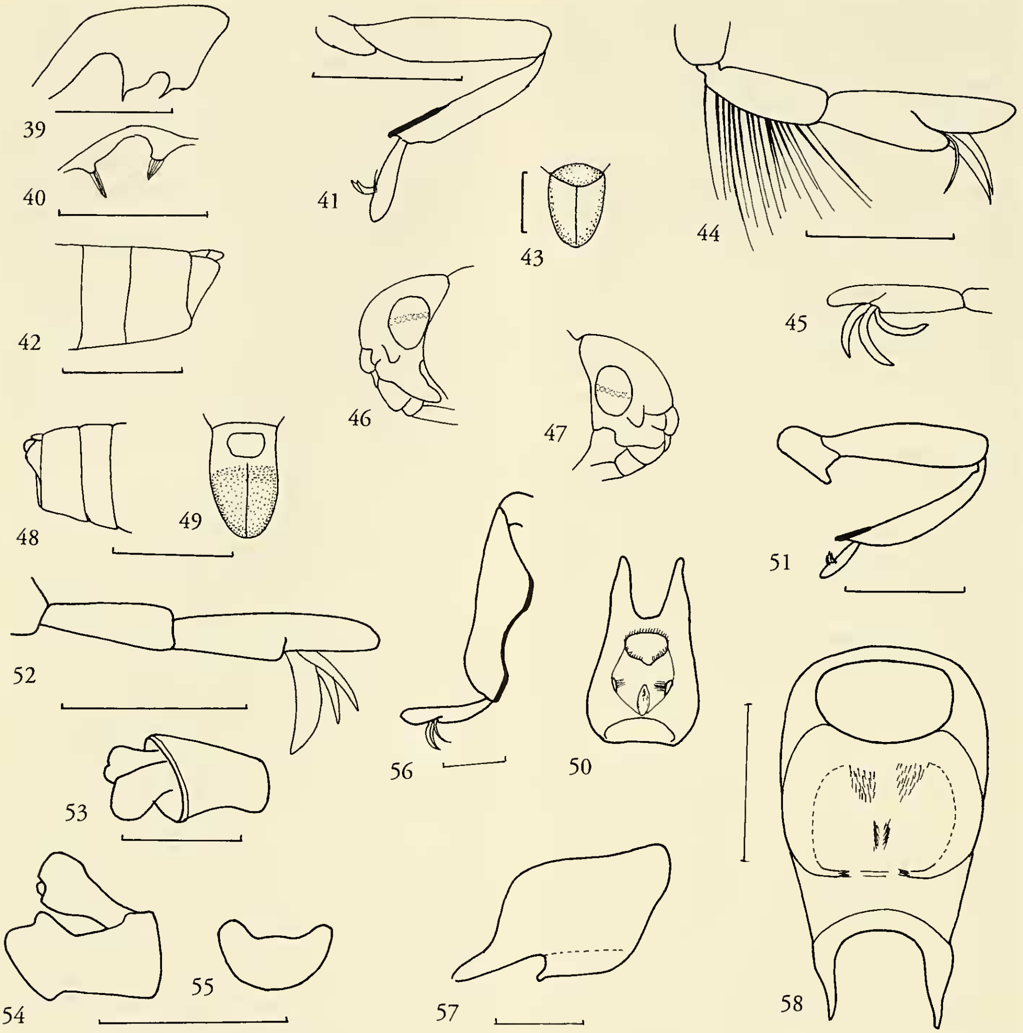
Macropterous form unknown.

Etymology. – *Pyrokrene*, a greek noun in apposition, refers to the similarity with *P. feuerborni*.

Comparative notes. – The ventral impression of first genital segment of male is of similar shape, but relatively larger, as in *P. feuerborni* Lundblad, in addition the male of *P. feuerborni* has a slightly curved hind tibia with a group of small spines apically which is lacking in *P. pyrokrene* which has hind tibia virtually straight and the fore tibial comb of *P. feuerborni* consists of 45 coarse proximal and a 'hardly countable number' of fine teeth in the distal part (lauter winzigen, kaum zählbaren Dornen, Lundblad 1934: 335). *P. feuerborni* is only known from macropterous specimens but in sofar comparison with apterous specimens gives clues, it appears quite related to *P. pyrokrene*. In general shape the female reminds of *P. koutali* but lacks the tuft of caudally directed dark bristles on tergite 8.

Pseudovelia sangihe sp. n. (figs. 39-43)

Type material. – Holotype apterous male: INDONESIA: Sulawesi Utara, Pulau Sangihe, Laine, Sungai Laine at waterfall, at edge of pothole between plants (*Hydrilla*) and floating plant debris, shade, '*Pseudovelia* especially at spots with some foam', 12.XI.1994, N9463, leg. N. Nieser (ZMAN). Paratypes (adults only), same data as holotype 8♂ 4♀ apt., 4♂ 2♀ macr., 22 larvae III/V distributed as follows; 1♀ apt. (allotype) 1♂ 1♀ macr. ZMAN, 1♂ apt., MBBJ, 1♂ apt. NMSC, 1♂ 1♀ apt., 1♂ macr. RMNH, 1♂ apt. SEMC; P. Sangihe, Lelepu, Sungai Lelepu, mainly lowland stream aspect, shaded pools under overhanging vegetation, no foam, 13.XI.1994, N9464, 1♂ 5♀ apt., 1♂ macr., 2 lvV (1♀ MBBJ, 1♂ 1♀ MUDH, 1♀ NHMW, 1♂ macr., 1♀ SEMC, 1♀ ZMUC); P. Sangihe, Desa Utaurano, Sungai Apanukang, pothole, at edge between vegetation, no foam, 14.XI.1994, N9465A, 3♂ 6♀ apt., 1♀ macr. [S. Apanukang is an upstream tributary of S. Laine near Naha, which is different from S. Laine at Laine]; P. Sangihe, Sungai Masalihe, mountain stream in rather deep (c. 20m) gorge, Pseudovelia from puddles at edge of stream bed, 16.XI.1994, N9468, 4♂ 4♀ apt.(1♂ 1♀ JTPC, 1♂ NHMW, 1♀ SEMC, 1♂ 1♀ ZC, 1♂ 1♀ ZMUC); P. Sangihe, Sungai Kendahe, bridge at Poto, mountain stream, pools at edge of stream bed, 17.XI.1994, N9471, 3♂ 4♀ apt.; P. Sangihe, smaller stream near N9471, 17.XI.1994, N9473, 6♂ 1♀ apt., 1♂ macr., 2 lvV; P. Sangihe, mountain stream at Bowokulu, rather small stream with rocky bottom and large boulders, parts with strong current alternating with virtually stagnant pools, *Pseudovelia* at edges under overhanging rocks, 19.XI.1994, N9477, 2♂ 8♀ apt. (1♂ 1♀ PCHC).



Figs. 39-43. *Pseudovelia sangihe.* Paratypes: 39-43 male, 39-40 segment 8, 39 lateral view, 40 detail of rim of ventral impression on segment 8 ventrolateral view, 41 fore leg, 42-43 female apex of abdomen, 42 lateral view, 43 caudal view. – 44 *Pseudovelia argyropardala.* Male paratype hind tarsus. Scale 0.25 mm. – 45 Tarsal segment (*P. sexualis*) illustrating blade like ventral arolium. – 46-47 Head of *Pseudovelia* in lateral view: 46 *P. buccula* illustrating caudally prolonged ventral lobe, 47 *P. lundbladi* with normal ventral lobe. – 48-49 *Pseudovelia argyropardala* female paratype apex of abdomen, 48 lateral view, 49 caudal view. – 50 *Pseudovelia lundbladi* male segment 8 in ventral view. – 51-55 *Xiphovelia skoteina.* Male paratypes: 51 middle tarsus, 52 fore leg, 53 genital segments lateral view, 54-55 segment 9, 54 lateral view, 55 caudal view. – 56-58 *Pseudovelia kalami* holotype male; 56 fore tibia and tarsus, 57-58 segment 8, 57 lateral view, 58 ventral view.
Scale lines for figs. 41, 48, 51: 0.5mm; 39-40, 42-58: 0.25 mm.

Description. – Apterous specimens. Dimensions. Length ♂ 2.12-2.15, ♀ 2.36-2.45; width (across abdominal tergites 4-5) ♂ 0.72-0.76, ♀ 0.92-0.96; width of head ♂ 0.50-0.51, ♀ 0.52-0.56. Colour and pilosity. Dorsally pale orange to pale brick red, head darker, brownish, anterior third of pronotum lighter; lateral and ventral parts lighter than dorsum. Coxae and basal 3/4 of femurs yellowish, remainder of appendages darker, brownish; sutures between body sclerites and spiracles blackish, especially on abdomen. Bands of silvery hairs along inner margins of eyes distinct; patches of silvery hairs laterally on first abdominal tergite, covering most of tergites 2 and 3 and mediocaudally on tergite 6. Body clothed with rather short light brown pilosity which is more distinct ventrally than dorsally. Antennae and legs with usual pilosity.

Length of antennal segments I-IV, 0.43 : 0.28 : 0.31 : 0.47. Anterior third of pronotum smooth, coarse punctation on posterior two thirds sparse and rather indistinct. Lateral margins of pronotum smoothly curved, not or hardly indented, greatest width on posterior third. Ventral arolia bristle like. Middle tibia with about seven long erect hairs on inner side of apical half, becoming distinctly shorter apically. Hind tibia with slightly denser and thicker pilosity apically.

Male. Elongate, connexiva roughly horizontal to slanting slightly upward, lateral margins diverging in anterior, converging in posterior half. Length of antenna slightly more than two thirds of body length (1.5/2.1). Pronotum one and a half times as wide as its median length (0.6/0.4), narrower than width across metanotum. Anterior trochanter rounded. Apical comb on fore tibia relatively short, ± one third (0.2/0.6) tibial length (fig. 41), consisting of about 140 teeth of equal width. First segment of hind tarsus apart from the normal pilosity with 2-3 long (longer than diameter of segment) cilia ventrally. Abdominal tergite 1 large, smooth, sloping downward posteriorly; tergites 2-7 flat, horizontal, in lateral view concealed by the connexiva. Pregenital tergite ± one fifth the dorsal median length of abdomen. First genital segment with a large ventral impression, anteriorly and posteriorly with a pair of spine-like structures, consisting of closely packed bristles (figs. 39, 40).

Female. More broadly oval than male. Connexiva nearly horizontal to slanting 0.16π upward, their lateral margin evenly curved with its greatest width on tergite 4-5. Length of antenna slightly less than two thirds the length of body (1.5/2.4). Pronotum slightly over one and a half as wide as its median length (0.65/0.4), distinctly narrower than width across metanotum. Abdominal tergite 1 large, smooth, sloping downward posteriorly; tergites 2-7 flat, horizontal, in lateral view concealed by the connexiva (except in gravid females). Caudal apices of connexiva rounded, remaining considerably removed from each other, leaving tergite 7 visible. Tergite 8 oriented horizontally, fully visible in dorsal view. Pregenital segment large, its sternite slightly more than one fourth the median length of abdominal venter (0.3/1.1). Genital segments relatively large and protruding caudally, more or less U-shaped in caudal view (fig. 42, 43).

Macropterous form. – Structurally essentially as apterous form except for the usual modifications of macropters in the subfamily. Length ♂ 2.15-2.36, ♀ 2.30-2.35; humeral width of pronotum ♂ 0.85-0.90, ♀ 0.90-0.92. Pronotum brown with a lighter T-shaped mark, anterior transverse leg broad, posterior longitudinal leg narrow, disc of pronotum indistinctly punctate. Hemielytra grey-brown with basal cells largely sordid white and apical cells brownish with lighter centres and membrane greyish. Venation distinct, two elongate basal cells and two shorter apical cells. Lateral keels on basal part of abdomen reaching to the caudal margin of tergite 4, medial keels reaching onto basal part of tergite 2.

Etymology. – *Sangihe* is the Sangirese name for the island where this species was found (Sangir in bahasa Indonesia).

Comparative notes. – (See key). The male genitalia are of a similar shape as in *P. aflia*, *P. borneensis* and *P. epimekta*. Of these *P. borneensis* has an additional mediocaudal ventral projection on first genital segment (fig. 9); *P.epimekta* has the first genital segment and first antennal segment distinctly longer and *P. aflia* has the ventral spine-like groups of bristles less developed.

Pseudovelia borneensis Andersen
(figs. 7, 9)

Pseudovelia borneensis. – Andersen 1983: 264, figs. 35-38.

Material. – BRUNEI DARUSSALAM: Labi Road, Kota Teraja, mountain stream, on foam upstream of log, 15. IV. 1993, N9343A, 1♂ 6♀ apt., 3♂ 6♀ macr.(1♀ apt. 1♀ macr. BMKB, 1♀ macr. NMSC, 1♀ macr. NHMW, 1♀ apt. RMNH, 1♀ apt. ZMAN); Kuala Belalong, small stream behind Field Study Centre, 16. IV. 1993, N9345, leg. N. Nieser, 1♂ 2♀ apt.

Distribution. – Northern Borneo (Sarawak, Brunei, Sabah).

Remarks. – *P. borneensis* was described from macropterous specimens. The apterous form agrees structurally with the macropterous except for absence of wings and reduction of thorax. Dimensions of apterous form: L ♂ 2.35, ♀ 2.43-2.52; width of head ♂ 0.55, ♀ 0.56-0.60; width of pronotum ♂ 0.70, ♀ 0.72-0.77; width ♂ 0.81, ♀ 0.82-0.88. The connexiva of apterous females are nearly vertical whereas in macropters they slant laterally. The pattern of silvery hairs on head and pronotum is identical in both forms, the patch medially on hind margin of head may be rather insignificant in some specimens, both apters and macropters. Apters have patches of silvery hairs laterally on abdominal tergite 1, nearly the whole of tergites 2 and 3 and the posterior 2/3 of tergites 6 and 7.

Pseudovelia reiseni Polhemus
(figs. 17-19)

Pseudovelia reiseni Polhemus 1976: 272-273

Material. – PHILIPPINES: Luzon, Laguna, Los Baños,

Table 1 Measurements of leg segments of Microveliinae described in this paper.

	femur	tibia	tars1	tars2
Pseudovelia aflia				
♂ fore leg	0.61	0.57	0.30	
♂ middle leg	0.72	0.73	0.17	0.28
♂ hind leg	0.81	0.88	0.20	0.27
♀ fore leg	0.65	0.53	0.32	
♀ middle leg	0.73	0.71	0.18	0.29
♀ hind leg	0.86	0.90	0.19	0.27
Pseudovelia afrofila				
♂ fore leg	0.70	0.60	0.29	
♂ middle leg	0.82	0.74	0.12	0.30
♂ hind leg	0.88	0.92	0.16	0.28
♀ fore leg	0.69	0.54	0.30	
♀ middle leg	0.78	0.90	0.14	0.26
♀ hind leg	0.82	0.90	0.14	0.26
Pseudovelia argyropardala				
♂ fore leg	0.63	0.61	0.31	
♂ middle leg	0.83	0.80	0.15	0.30
♂ hind leg	0.84	0.88	0.19	0.32
♀ fore leg	0.66	0.60	0.34	
♀ middle leg	0.82	0.81	0.15	0.30
♀ hind leg	0.91	1.00	0.17	0.31
Pseudovelia epimekta				
♂ fore leg	0.85	0.82	0.40	
♂ middle leg	0.96	1.00	0.25	0.30
♂ hind leg	1.12	1.30	0.41	0.30
♀ fore leg	0.88	0.83	0.40	
♀ middle leg	0.99	1.34	0.25	0.27
♀ hind leg	1.21	1.34	0.42	0.31
*Pseudovelia kalami**				
♂ fore leg	0.80	0.75	0.30	
♂ middle leg	1.03	1.04	0.20	0.38
♂ hind leg	0.98	1.01	0.33	0.30
Pseudovelia koutali				
♂ fore leg	0.68	0.59	0.30	
♂ middle leg	0.82	0.82	0.20	0.30
♂ hind leg	0.86	0.87	0.24	0.26
♀ fore leg	0.69	0.63	0.35	
♀ middle leg	0.93	0.89	0.20	0.30
♀ hind leg	0.98	1.06	0.20	0.30
Pseudovelia mystax				
♂ fore leg	0.77	0.68	0.38	
♂ middle leg	0.93	0.94	0.19	0.33
♂ hind leg	0.99	1.11	0.22	0.32
♀ fore leg	0.81	0.70	0.38	
♀ middle leg	1.01	0.98	0.20	0.36
♀ hind leg	1.08	1.19	0.21	0.33
Pseudovelia pyrokrene				
♂ fore leg	0.70	0.60	0.31	
♂ middle leg	0.89	0.83	0.19	0.30
♂ hind leg	0.91	0.92	0.34	0.30
♀ fore leg	0.71	0.59	0.33	
♀ middle leg	0.87	0.82	0.19	0.28
♀ hind leg	0.98	0.99	0.23	0.31

	femur	tibia	tars1	tars2
Pseudovelia sangihe				
♂ fore leg	0.65	0.58	0.28	
♂ middle leg	0.83	0.79	0.17	0.30
♂ hind leg	0.87	0.95	0.21	0.26
♀ fore leg	0.61	0.57	0.29	
♀ middle leg	0.78	0.78	0.15	0.29
♀ hind leg	0.88	0.96	0.18	0.25
Xiphovelia skoteina				
♂ fore leg	0.49	0.39	0.20	
♂ middle leg	0.56	0.51	0.18	0.26
♂ hind leg	0.54	0.64	0.13	0.19
♀ fore leg	0.52	0.39	0.24	
♀ middle leg	0.61	0.53	0.19	0.28
♀ hind leg	0.59	0.69	0.13	0.22

* Measurements based on single specimen.

stream from Tampalit Falls, 15. XI.1993, leg. H. Zettel, 3♂ (2♂ NHMW, 1♂ NC); Luzon, Infanta, small pool (10x1.5m, up to 0.2 deep) at edge of river bed near mouth of Agos River, many gelatinous algae, 4. IV. 1993, N9335, leg. N. Nieser, 1♂ 1♀. Mindanao, Sarangani (S. Cotabato) prov. Siquel River, pool (area ± 20 m^2, 0.2 m deep) at edge of river bed, slightly turbid stagnant water, under overhanging grassy bank, 23. XI. 1993, N9351, leg. N. Nieser, 3♂; Lake Sebu area, just down stream of second waterfall at edge of spray area, sheltered edge downstream of boulders, 8. XII. 1993, N9373, leg. N. Nieser, 8♂ 1♀ (1♂ BMKB); stream, just downstream of dam at Lopo, under low overhanging grassy bank, 9. XII. 1933, N9377B, leg. N. Nieser, 3♂ 1♀ (2♂ 1♀ macr.; 1♂ apt., 1♂ macr. USCP); irrigation canal at Lopo, rather fast current, 9. XII. 1993, N9378, leg. N. Nieser, 1♀ macr. Apterous unless otherwise indicated.

Distribution. – Only known from Luzon and Mindanao.

Genus *Xiphovelia* Lundblad

Xiphovelia was erected by Lundblad (1933) to accommodate his *X. ensis* from Jawa. In addition there are a few species known from the Far East (Esaki & Miyamoto 1959) and one from Sri Lanka (Polhemus 1979). As these belong to the smaller Microveliinae, the paucity of described species is probably due to poor collecting. In specialisation of male genital segments they show some affinity to *Pseudovelia* (small with small parameres) although the genital segments are much smaller. On the other hand the structure of antenna with a short stout first segment, slightly narrower second and distinctly narrower third and fourth and the thoracical structure are quite different. In this genus the middle tarsus has a blade like ventral arolium and meso- meta- notum and first abdominal tergite are fused medially, in the description medial length of mesonotal area refers to the median length of these three tergites together. As stated by Andersen (1982) character states of genera of Microveliinae have not yet sufficiently been studied to get a clear picture about their relationship.

Xiphovelia skoteina sp. n.
(figs. 51-55)

Type material. – Holotype apterous ♂ INDONESIA: Sulawesi Utara, Lakes I, Quellbereich (source area), PPA Bungalow, Nov. 1985, leg. G. Zimmermann (RMNH). (The PPA bungalow is just N of the W tip of Danau Mooat). Paratypes, 51♂ 16♀ all apterous, same data as holotype, distributed as follows: 2♂ 1♀ (allotype) RMNH; 2♂ BPUH; 2♂ 2♀ PCHC; 2♂ 1♀ JTPC; 2♂ 1♀ MBBJ; 15♂ 2♀ NC; 20♂ 7♀ ZC; 3♂ 1♀ ZMAN; 2♂ 1♀ ZMUC. Dumoga Bone N. P. Tumpah River Beach, 19. Oct. 1985, leg. G. Zimmermann, 4♂ (2♂ NC, 2♂ ZC).

Description. – Apterous specimens. Dimensions. Length ♂ 1.80-1.90, ♀ 2.00-2.18, width (across metanotum/first abdominal tergite) ♂ 0.73-0.78, ♀ 0.90-0.99. Colour and pilosity. Generally dull dark ash-grey (anthracite), eyes shining, base of first antennal segment, segments 2 and 3 of rostrum , coxae, trochanters and basal part of femurs yellowish, remainder of appendages castaneous. Pronotum with an uninterrupted lighter band, about as wide as head, in most specimens only slightly contrasting with background. Body covered with well developed pilosity, yellowish, appressed, relatively fine and short on body, longer, more erect and somewhat darker on appendages, eyes bare.

Head slightly less than twice as wide as its median length (0.5/0.3). Length of antennal segments I-IV, 0.19: 0.19: 0.22: 0.31. Width of third antennal segment two third that of fourth (0.02/0.03). Body wall with shallow punctures, posteriorly more shallow and hence less distinct than anteriorly. Pronotum short, about five times as wide as long. median length of mesonotal area one fourth the median length of body (♂ 0.45, ♀ 0.52). Ventral arolia of fore and hind tarsus bristle like. Ventral arolium of middle tarsus leaflike (fig. 52). Middle and hind trochanter of subequal length. Middle tibia with about seven long hairs (apart from normal pilosity) in apical half of inner side, their length compared to the width of tibia (which is stout in both sexes) varying from slightly longer more distally to slightly shorter apically.

Male. General shape elongate oval, greatest width at posterior margin of metanotum, connexiva more or less horizontal, their lateral margins only slightly convergent posteriorly. Apical part of genital segments in dorsal view visible as a small caudal button (in most alcohol specimens genital segments expanded). Length of antenna slightly less than half the length of body (0.89/1.86). Measurements of leg segments, table 1. Anterior trochanter with an ventroapical knob (fig. 51). Dorsal margin of fore femur straight in apical three fourth. Dorsal ('outer') margin of fore tibia convex, grasping comb about half as long as tibia, more distinct in expanded apical part. Genital segments (figs. 53-55) in caudal view with comparatively low lateral 'ears'.

Female. General shape broadly oval, connexiva nearly vertical in most specimens, especially in posterior half where they are distinctly converging. Legs generally more slender than male, measurements of leg segments table 1. Anterior trochanter rounded, anterior tibia with an apical tuft os bristles, mimicking the apex of tibial comb of male. Abdominal tergite 7 somewhat longer than tergite 6, tergite 8 horizontal. Sternite 7 large, its median length one third the median length of abdominal venter. Genital segments retracted into abdomen.

Etymology. – *Skoteinos*, a Greek adjective meaning dark, sombre, refers to the general colour of the species.

Comparative notes. – In the key to *Xiphovelia* by Esaki & Miyamoto (1959) this species runs to *X. boninensis* Esaki & Miyamoto, due to the lack of shiny ('silvery') pilosity. Males of *X. skoteina* differ from all species described so far by the ventroapical tubercle of fore trochanter. Females of *X. boninensis* have the connexiva reflexed over the abdomen in caudal half, whereas in *X. skoteina* these are at most vertical. Moreover in *X. skoteina* the length of middle and hind trochanter is subequal while in other species the middle trochanter is distinctly longer than hind trochanter.

Discussion

Andersen (1983) deals with ten species of *Pseudovelia* from the Oriental Region (in addition seven taxa from the E. Palaearctic are listed). So in this paper the number of Oriental species is nearly doubled. In addition Dr. Zettel (NHMW) writes me that he has several apparently undescribed species from the Philippines. Apparently this is a, still undercollected, species rich genus in the area. They are usually found in shaded places (including overhanging banks or rocks) at the edges of streams or, more rarely, lakes. They are quite often found at places where some foam is assembled (probably because food is trapped in the foam).

Considering primarily the development of the male genital segments the genus *Pseudovelia* seems to split into two groups. The first group is the *hypodonta*-group of Andersen (1983), which is primarily characterized by 4-5 spine-like processes along the margin of the ventral impression of the first genital segment of male. On closer examination, these processes consist of a basal chitinous stump on which a small, acute narrowly packed tuft of bristles is placed. They also agree more or less in general colour pattern and body shape. The *hypodonta*-group consists of *P. aflia, P. borneensis, P. buccula, P. epimekta, P. hypodonta* and *P. sangihe.* Associated with this group is *P. koutali* whereas *P. lundbladi* which has anteriorly a broad ventral process which, although much shorter, reminds somewhat of the process in *P. koutali* and caudally three processes of the same type as found in the *hypodonta*-group may be considered a link between *P. koutali* and the *hypodonta* group. The second group which could be named *feuerborni*-group has the ventral impression on first genital segment of male bordered by a more or less distinct chitinous rim which can be fringed with hairs whereas the impression itself may also be clothed with hairs. This group contains: *P. afrofila, P. argyropardala, P. feuerborni, P. gnoma, P. longitarsa, P. mystax, P. pyrokrene, P. reiseni, P. sexualis* and according to Andersen (1983) *P. tjurpensis.* Whereas the *hypodonta*-group is comparatively homogeneous, the *feuerborni*-group can be divided in four pairs of similar species with *P. mystax* with its rather simple first genital segment and whiskers on the second as the odd one out. The first pair is formed by *P. longitarsa* and *P. sexualis* which have in common blade-like ventral arolia and strongly hairy eyes. The second pair consists of *P. argyropardala* and *P. reiseni*, which have in common a ventral impression of first genital segment without strong rim and sublateral patches of hairs inside the impression. In addition the males have the 'swimming hairs' on first segment of hind tarsi more strongly developed than in other species and both are dark grey with very contrasting patches of silvery hairs which are arranged in roughly the same pattern. These two are also geographically more restricted than the other pairs, P. Karakelong is closer to the Philippines than to the main islands of Indonesia. *P. feuerborni* and *P. pyrokrene* have the ventral impression on first genital segment somewhat similar to *P.argyropardala/reiseni* (although the chitinous rim is somewhat better developed) but have the brick red colour of most *Pseudovelia* and distinctly less developed 'swimming hairs' on first segment of hind tarsi of male. Finally *P. afrofila* and *P. gnoma* are both smaller and more oval than the others and are generally of a dark grey colour with a contrasting transverse rectangular orange mark anteriorly on pronotum. *P. kalami* finally is quite aberrant, apart from the fore tibia the antennal structure and the large depression in male venter are different from other species. This species might turn out to represent a distinct subgenus or closely related genus.

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REFERENCES

Andersen, N. M., 1982. The semiaquatic bugs (Hemiptera, Gerromorpha). – Entomonograph 3: 1-455.

Andersen, N. M., 1983. The Old World Microveliinae (Hemiptera: Veliidae) I. The status of *Pseudovelia* Hoberlandt and *Perivelia* Poisson, with a review of Oriental species. – Entomologica Scandinavica 14: 253-268.

Arnett, jr., R. H., Samuelson, G. A., & Nishida, G. M., 1993. The insect and spider collections of the world. – Flora & Fauna Handbook 11: i-v, 1-308.

Esaki, T., & Miyamoto, S., 1959. Veliidae of Japan and its adjacent territory (Hemiptera-Heteroptera) II. *Xiphovelia* Lundblad. – Sieboldia 2: 91-108, pls.10-13.

Lundblad, O., 1933. Zur Kenntnis der aquatilen und semiaquatilen Hemipteren von Sumatra, Java und Bali. – Archiv für Hydrobiologie Supplement 12: 1-195, 263-488.

Nieser, N. & Chen, P. P., 1991. Naucoridae, Nepidae and Notonectidae, mainly from Sulawesi and Pulau Buton (Indonesia). – Tijdschrift voor Entomologie 134: 47-67.

Nieser, N. & Chen, P. P., 1993. The *Rhagovelia* (Heteroptera: Veliidae) of Sulawesi (Indonesia). – Tijdschrift voor Entomologie 136: 259-281.

Polhemus, J. T., *Pseudovelia reiseni* Polhemus n. sp. p. 272-273, fig. 2. – In J. T. Polhemus & W. K. Reisen, 1976. Aquatic Hemiptera of the Philippines. – Kalikasan, Philippine Journal of Biology 5: 259-294.

Polhemus, J. T., 1979. Results of the Austrian-Ceylonese Hydrobiological Mission 1970. XIX: Aquatic and semiaquatic Hemiptera of Sri Lanka from the Austrian Indo-Pacific Expedition, 1970-71. – Bulletin of the Fisheries Research Station, Sri Lanka 29: 89-113.

Zimmermann, G., 1984. Heteroptera aus dem Nepal-Himalaya. *Geovelia* n. gen. eine Gattung terrestrischer Microveliinae (Insecta: Gerromorpha: Veliinae). – Senckenbergiana Biologia 65: 65-74.

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